CLAIMS

1. Method of preparing a metal oxide layer on a substrate, in which the following successive steps are carried out:

a) a metal oxide powder is dispersed in a liquid medium comprising a dispersion solvent and a dispersant, the said liquid medium containing neither plasticizer nor binder, by means of which a suspension A of the said metal oxide powder in the said liquid medium is obtained;

b) a solution of at least one polymer in a solvent is added to the said suspension A, by means of which a suspension B is obtained;

c) suspension B is deposited on the substrate by a dip coating method, by means of which a green layer is obtained;

d) the green layer obtained in step c) is dried; and

e) the dried layer obtained in step d) is calcined.

2. Method according to Claim 1, in which the metal oxide layer obtained after step e) has a thickness of 1 to 100 μm.

3. Method according to Claim 2, in which the metal oxide layer obtained after step e) has a thickness of 1 to 10 μm.

4. Method according to any one of the preceding claims, in which the metal oxide is chosen from: simple oxides of the transition metals and lanthanides; mixed oxides of several of these metals; and mixtures of these simple oxides and mixed oxides.

5. Method according to any one of the preceding claims, in which the metal oxide is yttrium-stabilized zirconia of cubic or tetragonal structure.

6. Method according to any one of the preceding claims, in which the dispersion solvent is chosen from water, ketones, aliphatic alcohols and mixtures thereof.

7. Method according to Claim 3, in which the dispersion solvent is an azeotropic mixture of ethanol and methyl ethyl ketone.

8. Method according to any one of the preceding claims, in which the content of metal oxide powder in suspension A is 1 to 80% by weight, preferably 20 to 60% by weight, more preferably 30 to 50% by weight and better still 30 to 40% by weight.

9. Method according to any one of the preceding claims, in which the metal oxide powder particles have a size of 5 nm to 5 μm, preferably 100 to 300 nm and better still 50 to 300 nm.

10. Method according to any one of the preceding claims, in which the dispersant is chosen from ionic surfactants and non-ionic surfactants, such as phosphate esters.

11. Method according to Claim 10, in which the dispersant is the phosphate ester MELIORAN® PE-312 sold by CECA® S.A.

12. Method according to any one of the preceding claims, in which the mass content of dispersant in suspension A is from 0.1 to 10% by weight, preferably 2 to 3% by weight, relative to the mass of dry metal oxide powder added.

13. Method according to any one of the preceding claims, in which the polymer is chosen from poly(aliphatic)esters.

14. Method according to any one of Claims 1 to 12, in which the polymer is a polymer obtainable from the reaction between hexamethylenetetramine and acetylacetone in acid medium, for example in acetic acid.

15. Method according to any one of the preceding claims, in which the solution of at least one polymer of step b) furthermore contains the same metals as those of the oxide powder.

16. Method according to any one of the preceding claims, in which the solution of step b) has a viscosity of 5 mPa.s to 1000 mPa.s, preferably 20 to 100 mPa.s.

17. Method according to any one of the preceding claims, in which, in step b), the polymer solution is added to suspension A in a proportion expressed as a mass ratio (r_m), namely the ratio mass of polymer solution/mass of dispersion A, of 0.01 to 3, preferably 0.1 to 0.6 and more preferably 0.1 to 0.5.

18. Method according to any one of the preceding claims, in which the dip coating method of step c) includes a step of removing the substrate from suspension B at a controlled rate of 0.1 to 100 cm/min, preferably 1 to 10 cm/min.

19. Method according to any one of the preceding claims, in which the drying is carried out at a temperature ranging from room temperature to 150°C, preferably from room temperature to 50°C.

20. Method according to Claim 19, in which the drying time is from 1 min to 10 h, preferably about 1 h.

21. Method according to any one of the preceding claims, in which the calcination of step e) is carried out at a calcination temperature of 200 to 1800°C, preferably 400 to 1800°C and more preferably 1000 to 1400°C.

22. Method according to Claim 21, in which the calcination temperature is reached, starting from room temperature, at a rate of increase of 0.1 to 100°C/min, preferably 1 to 10°C/min.

23. Method according to Claim 21, in which the calcination temperature is maintained for a time of a few seconds, for example 2 seconds to several hours, preferably 1 to 10 h.

24. Method according to any one of the preceding claims, in which, in step e), the metal oxide layer and the substrate undergo a simultaneous sintering, or cosintering, operation.

25. Method according to any one of the preceding claims, in which the substrate is a fully dense substrate, for example a refractory oxide substrate.

26. Method according to any one of Claims 1 to 24, in which the substrate is a porous substrate having an open and/or closed porosity ranging up to 50% by volume.

27. Method according to any one of the preceding claims, in which the substrate is chosen from: metal substrates, such as steel, silicon or aluminium substrates; ceramic substrates, such as alumina or yttrium-stabilized zirconia substrates, whether or not doped; glass substrates; and composite substrates formed from two or more of these families of materials.

28. Method according to Claim 27, in which the substrate is a porous Ni-YSZ cermet substrate forming for example an anode, for example of an SOFC fuel cell.